

Figure 4-39. Proper ladder angle.

ies the ladder while the man on the outside raises the fly to the desired height and locks the pawls (fig. 4-42).

(7) The ladder is then lowered to the building by both men.

(8) To lower the ladder, reverse the operations.

**c. Four-Man Raise for Bangor Ladders.** Although six men should be used to raise Bangor ladders, shortage of manpower frequently makes it necessary to use the four-man raise. The procedure is as follows:

(1) The four men remove the ladder from the apparatus and carry it to the desired point. Then ground it at right angles to the building with the



Figure 4-40. One-man ladder raise.

heels close to the building. The four men then take their positions as shown in figure 4-43.

(2) Nos. 1 and 2 release the tormentors and pass them overhead to Nos. 3 and 4; then they return to a position just below the tormentor swivels.

(3) Facing the top of the ladder, Nos. 1 and 2 grasp a common rung and raise the ladder overhead; then they swing around in under the ladder and raise it to the vertical position by walking toward the foot. The pole men assist as soon as the ladder is raised above the beam men's heads.

(4) Nos. 1 and 2 grasp a convenient rung, and with their other hands on the beam, lift and carry the heel to the proper distance from the building.

(5) Nos. 1 and 2 each place a foot on the rung, and Nos. 3 and 4 pull the ladder to the vertical position with the tormentors. Nos. 1 and 2 then raise the ladders and lock the pawls.

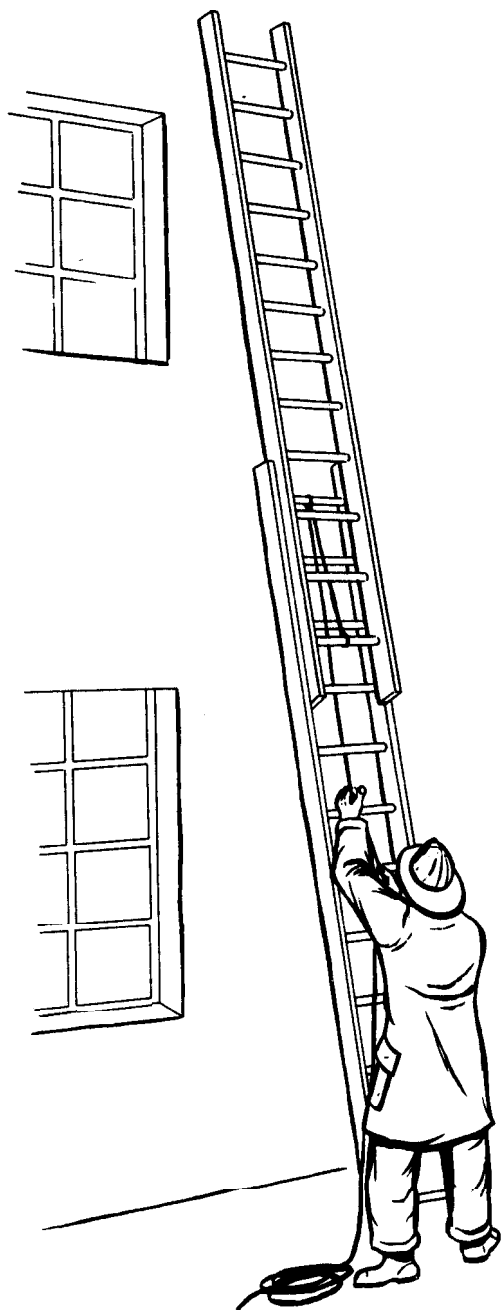


Figure 4-41. Placing of one-man raised ladder.

(6) The ladder is then held in place by Nos. 1 and 2 while Nos. 3 and 4 lower the ladder to the building with the tormentors. The tormentors are then locked in place.

**d. Six-Man Raise for Bangor Ladders.** Six men should be used to raise Bangor ladders whenever possible. The procedure is as follows :

- (1) The men remove the ladder from the apparatus and carry it to the desired location.
- (2) The men ground the ladder with the fly

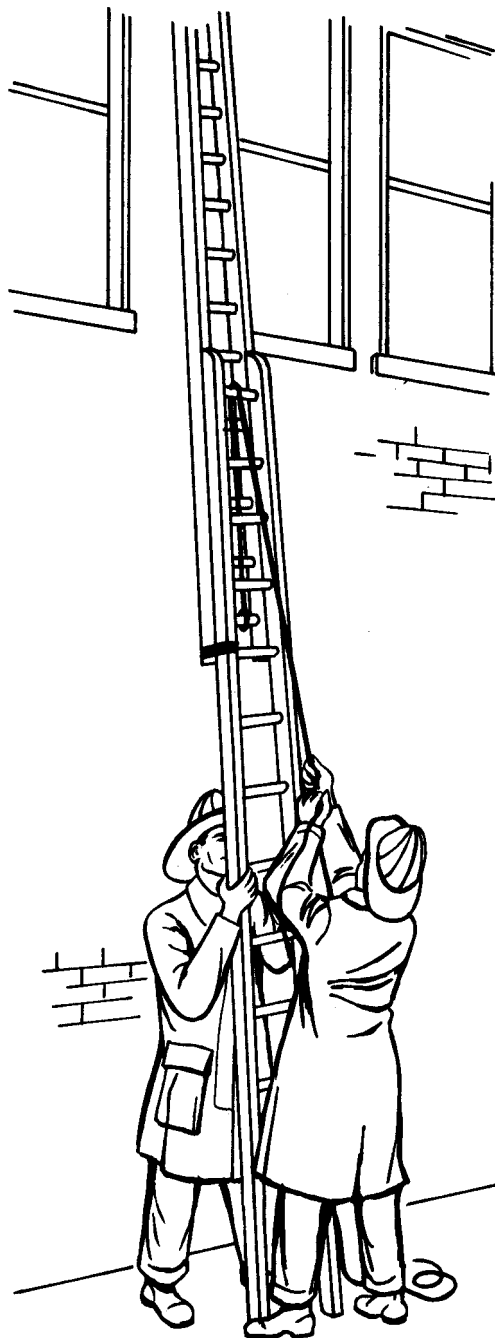


Figure 4-42. Two-man ladder rake.

ladders on top, then they take their positions as in figure 4-44.

(3) Nos. 1 and 2 release the tormentors by pulling the keys, raise the ends, and pass them to Nos. 3 and 4, who, in turn, pass them to Nos. 5 and 6, the tormentor men. With the spur of the tormentors between the first and second fingers of the hand nearest the spur when standing outside the tormentors, the other hand grasps the **tormen-**

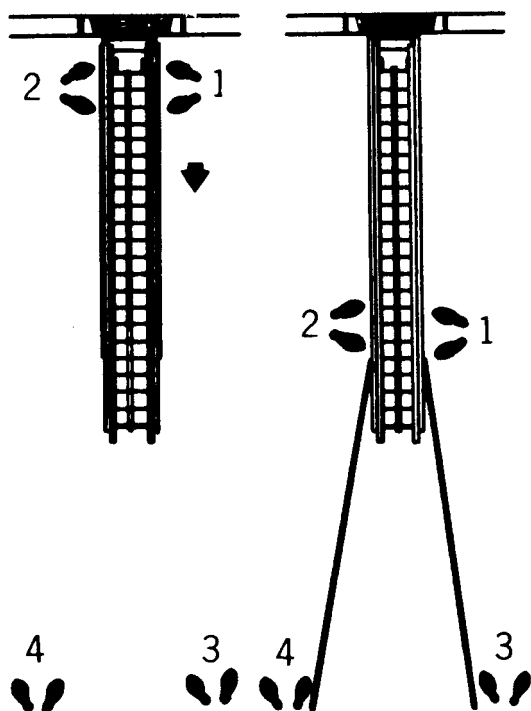


Figure 4-43. Four-man Bangor ladder rake.

tor at arms' length. These men should be about 5 feet (1.5 meters) apart.

(4) Nos. 1 and 2 stand on the heel plates and reach over and grasp a convenient rung as the ladder is raised.

(5) Nos. 3 and 4, facing the top of the ladder, reach down and grasp a common rung, raise the ladder overhead, swing under the ladder, and raise it using every other rung. Nos. 5 and 6 take the weight from Nos. 3 and 4 with their tormentors as soon as possible, pushing the ladder to the vertical position.

(6) When the ladder is vertical, No. 5 will swing to the inside of his tormentor pole and carry it around to a position at right angles to the other tormentor (fig. 4-45). This steadies the ladder and allows it to be set plumb.

(7) Nos. 3 and 4 heel the ladder while Nos. 5 and 6 lower the ladder to the building with the tormentor poles. The tormentors are then set under the ladder to prevent sidesway.

(8) To lower the Bangor ladder, reverse the operations.

#### 4-35. Ladder Climbing

a. Ladder climbing is involved in the duties of rescue, ventilation, and extinguishment, including the moving of hose, ladders, and other **cumber-**

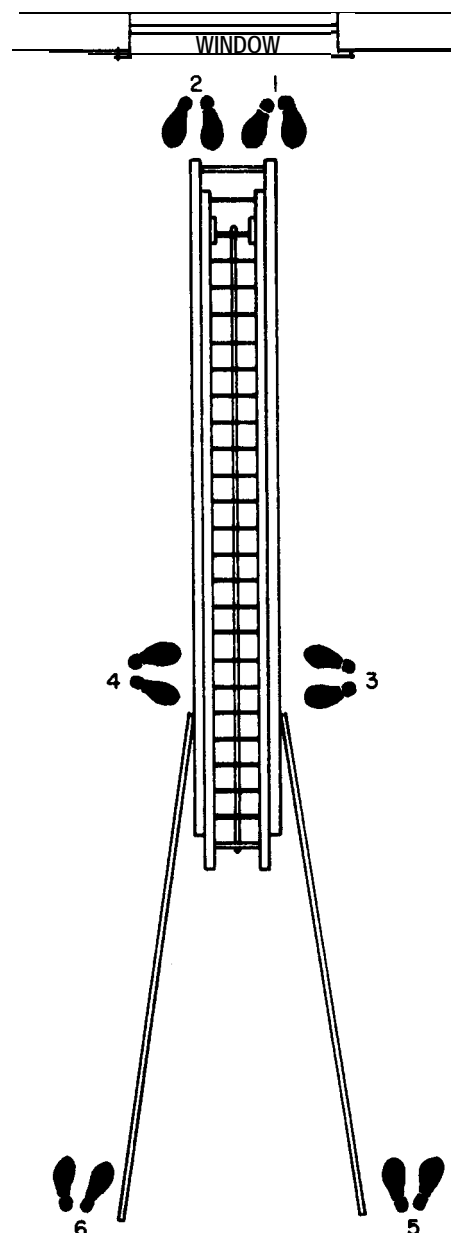


Figure 4-44. Six-man Bangor ladder raise.

some but necessary equipment. Since all these duties must be carried out swiftly under the strain of a fire emergency, ladder climbing becomes a highly important skill. To acquire ease in ladder climbing and its related uses, the average man needs much practice.

**b.** In climbing a ladder, one hand is always on one of the rungs, unless an article of equipment is being carried up or down the ladder. If something is carried in one hand, it should be slid along the beam, if possible, to give the climber at least a limited hold at all times.

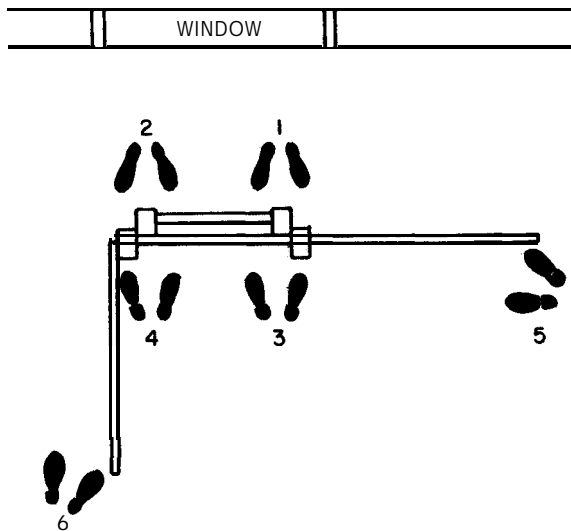


Figure 4-45. Position of tormentor men-Bangor ladder.

c. An unnatural coordination exists in proper ladder climbing, for while one foot or the other must be placed on every rung, one hand or the other moves only once for each two rungs ascended by the feet.

d. The feet should be placed in the center of each rung to prevent the ladder from wobbling. For speed and smoothness, the body should be carried in a nearly upright position with the arms moving outward almost in an arch as the hands are changed from rung to rung. The ball of the foot should be placed on each rung to get complete advantage of the leverage afforded by the angle. When poor weather provides little traction between the boot and rung, the arch in the center of the boot should be placed on the rung as a safety measure. Using the ball of the foot for climbing permits more speed and smoothness and takes less effort. Climbing should be steady and smooth, and no attempt made to run either up or down a ladder. The upper part of the body should move so evenly that it appears to be standing on an escalator.

e. Locking in on a ladder means simply placing the leg between two rungs and bringing the foot back out between the next lower rungs and locking the foot either around the rung or around the beam (fig. 4-46). This leg lock enables the man on the ladder to work with both hands free to handle hose, ladders, and tools. Men should anchor themselves to a ladder with a rope hose tool or a safety belt only when one position must be kept for a long time. Short men are more comfortable when they lock one foot around the rung above the one

on which the other foot is placed, while tall men usually are more at ease when they lock one foot around the beam.

f. For safety, especially when there is considerable weight and activity on a ladder, it should be anchored to the building with a rope hose tool, hose chain, or strap. This anchor prevents the ladder from slipping or turning over when the load is shifted; it also eliminates much of the vibration caused by activity on the ladder. When necessary, the slack must be taken from the rope by twisting it or taking an extra turn around the ladder rung.

#### 4-36. Pumping Operations

It is difficult to establish a definite, rigid procedure for the operation of firefighting pumps because fire services employ many types of pumps. Each type of pump normally is manufactured by many corporations, and each corporation, in turn, locates the pump valves and levers in various places on the apparatus. Although comparable valves and levers may serve almost identical purposes, they often differ considerably in appearance. Consequently, it is practical to give here only the operational sequence, eliminating details of description and location of the valves, levers, and gages.

a. *Placing the Booster Line in Operation.* All Army pumpers have booster tanks which contain a minimum of 150 gallons (568 liters) of water. The speed and efficiency with which a booster line can be placed in operation largely determines the amount of damage by smoke, fire, and water that can be prevented. The proper use of the booster line is frequently responsible for the extinguishment of fires at an early stage.

(1) To place the booster line into operation, first remove the line from the pumper and assign one crewman to man the nozzle. Since the hose usually is 1 inch (2.54 centimeters) or less in diameter, one man can operate the nozzle efficiently with the limited amount of pressure generated and volume discharged. Next, start the pumper engine, if not already running, and allow it to idle. Then place the pump in gear.

(2) Open the pump intake valve leading from the tank to the pump and allow the pump to fill with water. Then open the pump discharge valve leading from the booster line. With the engine still idling, allow the booster line to fill with water to the nozzle. Accelerate the engine until the gage

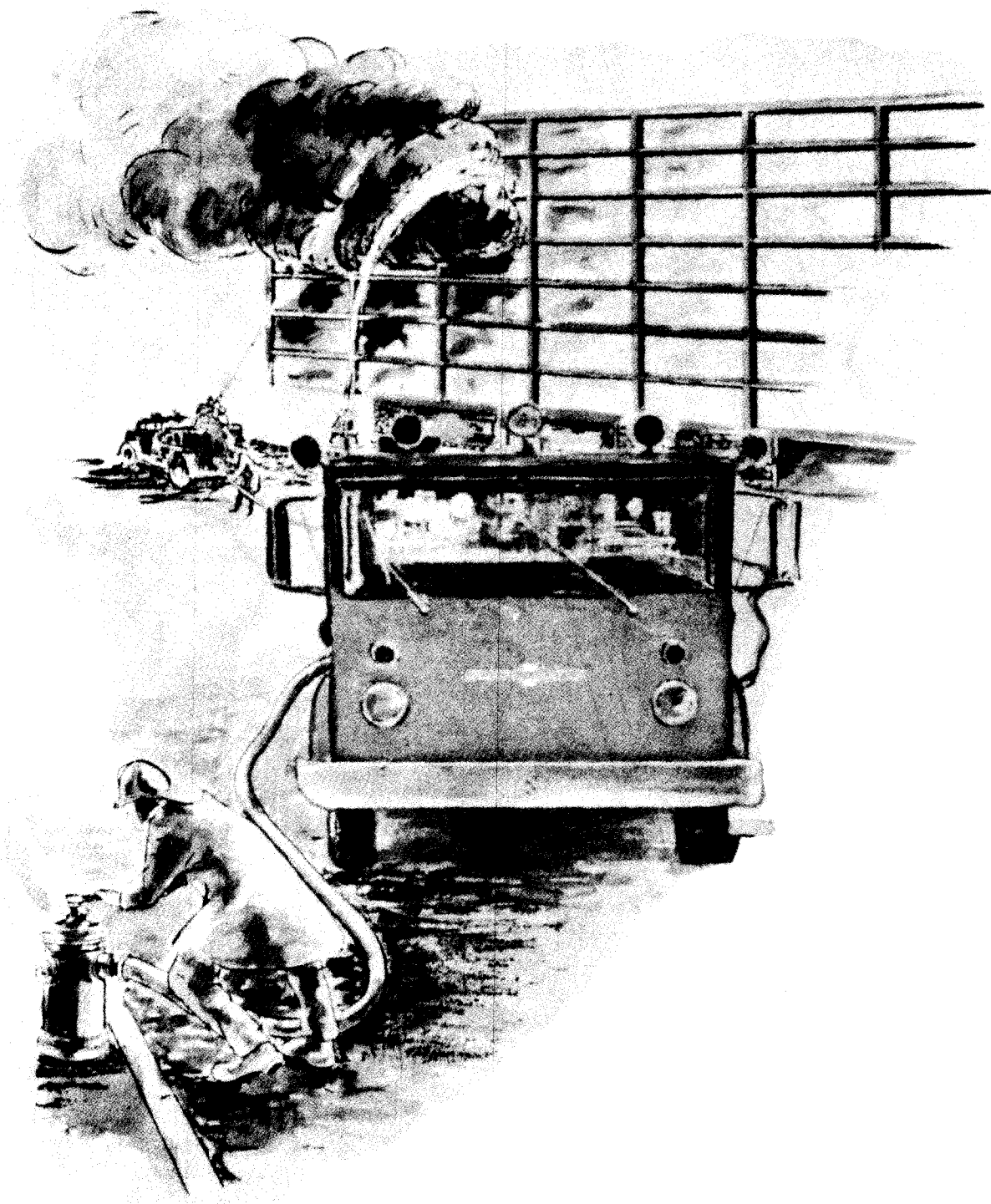


Figure 4-46. Looking in on a ladder.

on the control panel shows the pump pressure to be 100 psi, then open the nozzle. When it becomes desirable to shut down the pump, retard the throttle, close the pump discharge valve and the inlet valve, take the pump out of pump gear, and place it back in road gear. If it becomes necessary to close all discharge valves during pumping operations, the pump should be taken out of "pump" position and placed in "road" position. This will prevent the water in the pump from "boiling." The relief valve will take care of the pressure and heat for a short time, but not for extended periods.

b. *Taking Water from the Hydrant.* The pri-

mary rule to follow when taking water from a hydrant is as follows: A fire hydrant should be opened slowly to prevent pressure surges, and completely to prevent undue wear. To take water from a hydrant with a pumper (which may be necessary because of the great size of the fire or insufficient hydrant pressure), the pumper must be located strategically in relation to the hydrant. This will permit the suction hose to be connected conveniently and without kinking (fig. 4-47). The cap on the 4½-inch (11.43-centimeter) "steamer" connection of the hydrant should be removed and also the suction hose connected to the plug and the intake on the pump (which also requires the re-



*Figure 4-47. Pumping from hydrant.*

moval of a cap). The process is continued as follows:

(1) Break the hose at the proper coupling and connect it to one of the discharge outlets from the pump. After the pumper discharge valves and churn valves are checked and found closed, open

the hydrant valve. Start the pump engine, if not already running, and let it idle while the pump is put into gear. Open the discharge valve on the pump and accelerate the engine until the gage indicates the desired pressure.

(2) The desired pressure is determined by